

What is claimed is:

1.

A method for controlling an electric motor comprising an operating relay having relay windings with respective first and second relay contacts and a control means which motor via current conductors is connected to said relay and a power source wherein an  
 5 operator by using said control means controls the application of current to the motor armature or rotor and field coil(s) or field magnet(s) (M), characterised in that monitoring devices are provided which sense indicating parameters that are compared with respective corresponding reference values in a safety function unit in order to determine whether said contacts of said operating relay are mistakenly in the on  
 10 position, and if one of the said contacts is the on position, ensures the switching on of at least the other one of the said relay contacts so that the current application to the motor is interrupted and the motor stops.

2.

15 The method according to claim 1, characterised in that a voltage is sensed which is indicative of the voltage at the said relay winding, which voltage is compared with a reference voltage and if the voltage is found to be too low in relation to a threshold value at which the relays do not fail, but are close to doing so, the power supply to the relevant relay winding is cut off, and a delay device is activated which, prior to  
 20 reapplication of approved voltage to the said relevant relay winding after an interruption because of excessively low voltage, will be effected at a lower frequency than without the delay device.

3.

25 A method for controlling an electric motor comprising an operating relay having relay windings with respective first and second relay contacts, a control means, which motor via current conductors is connected to said relay and a power source, wherein an operator by using said control means controls the application of current to the motor armature or rotor and field coil(s) or field magnet(s) (M), characterised in that a voltage  
 30 is sensed which is indicative of the voltage at the said relay winding, which voltage is compared with a reference voltage and if the voltage is found to be too low in relation to a threshold value at which said relay does not fail, but is close to doing so, the power supply to the relevant relay winding is cut off, and a delay device is activated which, prior to reapplication of approved voltage to the said relevant relay winding after an  
 35 interruption because of excessively low voltage, will be effected at a lower frequency than without the delay device.

4.

A control system for an electric motor, comprising an operating relay having relay windings with respective relay contacts, a control means, which motor via current conductors is connected to said relay and a power source, wherein an operator by using  
 5 said control unit controls the application of current to the motor armature or rotor and field coil(s) or field magnet(s) in such manner that the operation of said motor is controlled, characterised in that the system further comprises a safety function unit and there are provided sensors/sensing means arranged at suitable measuring points in the system or motor circuit connected to the said safety function unit and arranged so that  
 10 when there is no control signal to the relays, said contacts of both relays are energised and the motor stops.

5.

The control system according to claim 4, characterised in that said safety function unit  
 15 is provided with terminals which via wires are connected to the control unit, wires are connected to one side of the respective relay windings, so that the voltage at the said windings can be sensed and given as a signal to the connected terminals on the said safety unit, whose opposite sides are connected via wire to the power source, and terminals are connected to the in the open position of the said relay non-energised relay  
 20 contacts, or other suitable measuring points in the system or motor circuit, for example, at the transition between said armature and said field coil(s) so that it can be sensed whether the said relay contacts are in an on position (energised), wherein the sensed value can be compared with a reference value, and the sensed position is given as a signal to the said terminals, and the signals from the respective relay contacts and the  
 25 relay windings are compared in the said safety unit, and a device is provided in the said safety unit which in the event of a discrepancy between the respective compared signals immediately applies an operating signal to the opposite side of the relevant relay winding, so that the electric circuit is broken and the motor stops.

30 6.

The system according to claim 5, characterised in that the safety unit further comprises a terminal which via a wire is connected to a wire connected to a junction between two relay windings or the input voltage to the motor or control system, so that the voltage at this point can be sensed and given as a signal to the said terminal, and in said safety unit  
 35 there is provided a device which determines whether the sensed voltage is too low in relation to a predetermined threshold value at which the relays do not fail, but are close to doing so, and a suitable delay device that is activated prior to each application of

voltage to the opposite side of the relevant relay winding so that in the event of relay failure, the application of voltage will be effected at a lower frequency than without the said delay device.

5 7.

The control system according to claim 4, characterised in that the safety function unit is equipped with terminals which via wires are connected to the control unit, and a terminal which via a wire is connected to a conductor or wire connected in a junction between two opposite relay windings, or another suitable measuring point in the system or motor circuit, so that the voltage at this point can be sensed and given as a signal to said terminal, and in the said safety unit there is provided a device which determines whether the sensed voltage is too low in relation to a predetermined threshold value, and a suitable delay device which is activated prior to each application of voltage to the opposite side of the relevant relay winding so that in the event of relay failure, the application of voltage will be effected at a lower frequency than without the said delay device.

8.

The system according to one of claims 4-7, characterised in that the control unit comprises one or more of joystick, touch panel, buttons, radio signal receiver, automatic control with suitable intelligence and/or switches.

9.

The system according to one of claims 4-7, characterised in that the sensors or sensing devices comprise microswitches and/or other suitable measuring devices or detectors.

10.

The system according to one of claims 4-9, characterised in that there is provided a thermoswitch connected between the motor armature and the safety function unit.